radiator, and, being kept loose and dry, prevents the heat rising from the earth to the water in the pans. Heat is cut off both top and bottom, and it is stated that the temperature of the air in contact with the dishes is reduced some 20° below that two or three feet higher up. This practice certainly seems to throw some light on the use of straw at home.

One thing, at any rate, is certain, that mists contribute largely to these ponds. What we need now is a scientifically-constructed pond on the Hubbard principle as a first experiment. At present I know of no other direct and unqualified statement as to what a dew-pond really is, how it is constructed, and why it attracts the dew, and it might, I think, be put to the test. Then if it were successful in collecting water, with no artificial introduction of a supply in the first place, meteorological observations might follow to show, if possible, the laws which were most potent in accomplishing it.

NOTES FROM THE WEATHER BUREAU LIBRARY.

By C. FITZHUGH TALMAN, Assistant Librarian.

HIGHEST ASCENT OF A SOUNDING BALLOON.

In Ciel et Terre of January 1, 1908, M. Vincent describes the ascent of a sounding balloon at Uccle, Belgium, on July 25, 1907, to an altitude of 26,557 meters (87,131 feet, or about 16½ miles), the greatest altitude known to have been attained by a balloon. The meteorograph worked perfectly, and the flight of the balloon was followed with a theodolite until it had descended to an altitude of 5,000 meters. The "inversion layer," "warm layer," or "isothermal zone"—as it is variously called in the recent literature of aerial exploration—was encountered at an altitude of 12,112 meters, at which point a temperature of —57° C. was recorded. From this point upward to an altitude of 13,591 meters the temperature rose 6.7° C. As the balloon continued to ascend the recorded temperature remained about stationary for some time, then began to rise slowly, and at the highest point of the ascent a temperature of —42.2° C. was recorded. The temperatures recorded during the descent of the apparatus agreed very closely with those recorded during the ascent at corresponding altitudes, despite the fact that the balloon fell much more slowly than it rose, and the air in the latter case, passing upward thru the apparatus, did not come in contact with any part of the mechanism exposed directly to the solar rays before reaching the thermograph.

A most interesting feature of the ascent was the generally westward drift of the balloon after reaching an altitude of about 19,500 meters up to the highest point attained. A zone of easterly wind at least 7 kilometers in thickness was thus shown to exist above the region of westerly wind.

THE "GOUFFRE" IN HAITI.

The October, 1907, number of the meteorological bulletin published by Professor Scherer, of the College St Martial, Port au Prince, Haiti, contains a note on the subject of the "gouffre," which is defined as "a noise resembling the rolling of thunder or the firing of distant cannon," and is said to have been frequently observed in Haiti, especially at the time of the eruption of Krakatoa. The word "gouffre," in this sense, does not appear in the dictionaries of Larousse and Littré, and is evidently one of the many expressions peculiar to the French West Indies. The phenomenon referred to, however, is a familiar one in many parts of the world, and is known under a great variety of names. In Italy it is variously called "bomba," "rombo," "boato," "bonnito," "bombito," "bombonamento," "borbottio," "muggito," "mugghio," "urlo," "baturlio," "trabusso," "tronazza," "tuono," "tromba," "rufa," etc., and the latest Italian investigator of the subject, Prof. Tito Alippi, has invented a new name, "brontidi," borrowed from the Greek, and meaning "like thunder."[1] In Holland and Belgium the name "mistpoeffer" prevails, while English writers have generally preferred the term "barisal guns," from the name of a town (Barisal, pronounced *barisahl'*) in the Ganges delta. The German term is "Nebelzerteiler" or "Nebelknall."

The cause or causes of this phenomenon are still obscure, but the elaborate investigations now in progress in Italy, under the direction of the Central Meteorological Office at Rome, will perhaps shed some light on the subject.

[1] Ciel et Terre, 1 juillet, 1907, p. 212.

PHENOLOGY IN THE BRITISH ISLES.

Phenological observations in the British Isles have for many years been especially associated with the name of Edward Mawley, phenological recorder to the Royal Meteorological Society. Writing on "Phenology as an aid to horticulture," in the Journal of the Royal Horticultural Society for June, 1907, Mr. Mawley reviews his work in this field and presents some of the results obtained. By reducing the number of plants observed from fifty to thirteen he was able to secure a large corps of competent observers, distributed over each of the eleven districts into which the British Isles are divided both for phenological and weather-forecasting purposes.

As a result of fifteen years' observations, it is found that there is an average difference of twenty-two days between the flowering of the same plants in the south of Ireland, the earliest of the eleven districts, and the north of Scotland, the latest district. The variations in certain districts from year to year are shown in Table 1.

TABLE 1.—*Mean results, with their variations from fifteen years' average (1891–1905), for the thirteen plants in those districts where there have been sufficient observations to warrant comparisons being made.*

	England, SW.		England, S.		England, Mid.		England, E.		England, NW.	
Years.	Day of year.	Variation from average.	Day of year.	Variation from average.	Day of year.	Variation from average.	Day of year.	Variation from average.	Day of year.	Variation from average.
		Days.		*Days.*		*Days.*		*Days.*		*Days.*
1891..	144	+10	144	+ 9	150	+11	147	+10	150	+ 6
1892..	139	+ 5	138	+ 3	144	+ 5	153	+ 6	147	+ 3
1893..	118	—16	122	—13	125	—14	123	—14	128	—16
1894..	126	— 8	130	— 5	135	— 4	127	—10	137	— 7
1895..	139	+ 5	138	+ 3	141	+ 2	138	+ 1	144	0
1896..	125	— 9	128	— 7	132	— 7	130	— 7	134	—10
1897..	130	— 4	132	— 3	136	— 3	132	— 5	142	— 2
1898..	133	— 1	135	0	138	— 1	136	— 1	141	— 3
1899..	136	+ 2	136	+ 1	141	+ 2	138	+ 1	145	+ 1
1900..	142	+ 8	141	+ 6	144	+ 5	143	+ 6	152	+ 8
1901..	138	+ 4	139	+ 4	141	+ 2	139	+ 2	144	0
1902..	139	+ 5	140	+ 5	145	+ 6	142	+ 5	152	+ 8
1903..	134	0	134	— 1	137	— 2	134	— 3	145	+ 1
1904..	139	+ 5	139	+ 4	142	+ 3	140	+ 3	149	+ 5
1905..	133	— 1	135	0	138	— 1	136	— 1	144	0
Mean.	134	.....	135	.....	139	.....	137	.....	144	.....

TEMPERATURE OF THE UPPER AIR OVER LAPLAND.

In the Annuaire de la Société Météorologique de France, July, 1907, M. Teisserenc de Bort sums up the most important results of the observations with sounding balloons made by his assistant, M. Maurice, at Kiruna, Lapland, during the early spring of 1907. Observations were made on the same dates at the observatory of Trappes, near Paris. A comparison of the two series shows that the upper air in the vicinity of the Arctic Circle, even at the end of the winter, has a temperature differing but little from that observed at the same altitude and at the same season in middle latitudes. With regard to the vertical distribution of temperature the following facts have been established:

1. The zone in which the temperature ceases to fall (with ascent of the balloon), the so-called "isothermal zone," the existence of which was demonstrated as early as 1901 by observations at Trappes, occurs also at the Arctic Circle.

2. The curious phenomenon first observed by Assmann, viz, a slight *rise* of temperature (with ascent) within the isothermal zone, is also indicated in the observations at Kiruna.

3. In middle latitudes the altitude at which the isothermal zone begins varies by several thousand meters, according to the general weather situation. This phenomenon is very

clearly marked at Kiruna. For example, on the 7th of March, with low pressure, the isothermal zone was encountered at 8,000 meters; on the 26th, in a high pressure area, the isothermal zone began at 11,000 meters. As Mr. Rotch has recently found a similar variation in America at about 39° north latitude, this phenomenon may be assumed to prevail generally over the globe, at least outside of the Tropics.

4. The isothermal zone indicates the upper limit of the cyclonic disturbances of the atmosphere, which, in Lapland as well as in middle Europe, evidently do not extend higher than from 8,000 to 12,000 meters.

THE RAINFALL OF SOUTH AMERICA.[2]

This is the subject of an important memoir by E. L. Voss, formerly connected with the meteorological service of the State of São Paulo, Brazil, and the author of a well-known work on the climate of southern Brazil. For the past five years Doctor Voss has been diligently collecting the widely scattered literature of South American climatology, with a view to writing a memoir on the subject; but the work has proven so much heavier than he anticipated that he has found it advisable, for the present, to discuss the rainfall only.

The author tabulates and discusses data for 378 stations, giving the mean monthly and yearly amounts of rainfall and, for many stations, the probability of rainy days, maximum rainfall in twenty-four hours, duration of wet and dry periods, etc. This is the most important collection of rainfall data for South America that has yet been made, and will hereafter need to be included in every climatological library. The work is accompanied by a series of isohyetal charts, which would, perhaps, be easier to consult if they had been shaded to indicate the gradations of rainfall, instead of being printed in a number of distinct colors, having only an arbitrary relation to one another.

Doctor Voss has laid bibliographers and librarians under a heavy obligation by giving, at the close of his work, a critical annotated list of the principal publications relating to South American climatology. Much interesting information is also given regarding the development of the meteorological services in several South American states.

NOTES.

A list of the seismological stations of the world appears in the 1907–8 edition of Minerva, the invaluable "yearbook of the learned world" founded by the late Dr. Karl Trübner, of Strassburg. More than one hundred stations are enumerated.

"The artificial dispersion of fog" is the subject of a paper in the Scientific American Supplement of July 13, 1907, abstracted from the Bulletin des Ingénieurs Civils de France. The author, M. Dibos, describes experiments with two forms of apparatus, both of which appear to have been highly efficient. In the first, which is especially well suited for use on shipboard, a jet of hot air is projected into the fog in any desired direction, and produces a clear space 200 meters (656 feet) in length. In the second, Hertzian waves are used, with even better results. The author believes the latter form of apparatus would be very useful to navigation and on railroads. The Chemin de Fer du Nord has been much interested in his experiments and has installed experimental apparatus at its Paris terminal.

We learn from Nature of August 8, 1907, that the Scottish members of Parliament have requested a government grant for the purpose of reequipping and reopening the Ben Nevis observatories.

[2] Voss, Ernst Ludwig. Die Niederschlagsverhältnisse von Südamerika. Gotha: Justus Perthes. 1907. iv, 59 p. 4°. (Petermanns Mitteilungen. Ergänzungsheft Nr. 157.)

The latest annual report of the meteorological service of Ceylon (i. e., the meteorological branch of the surveyor-general's office) announced that a new astronomical and meteorological observatory was in course of erection at Colombo, and would probably be in working order by the end of 1907. Colombo is the central meteorological station of the island.

In the Annuaire de la Société Météorologique de France, Octobre, 1907, M. Chauveau reports a period of exceptional cold in the French Congo during July, 1907, the lowest temperatures generally occurring on the 18th. At Notre-Dame-des-trois-Épis (altitude 70 meters) a minimum of 13° C. (55.4° F.) was recorded, while at Brazzaville (altitude 320 meters) a temperature of 12.3° C. (54.1° F.) is reported to have occurred on the 19th. Both these readings, however, were possibly too low. The interesting feature of the report is the fact that widespread illness was caused among both the European and the native residents by a departure of only a few degrees from the usual temperatures of the season—a variation from normal conditions that would have past unnoticed in our latitudes.

The past year has witnessed the inauguration of two American periodicals devoted to aeronautics, viz, the American Magazine of Aeronautics, published in New York, and the American Aeronaut, published in St. Louis. Both are printed on good paper, illustrated with excellent half-tone plates, and edited in a conservative spirit. Several articles of meteorological interest have appeared in each.

TEMPERATURE COURSES.

By HENRY GAWTHROP. Dated Swarthmore, Pa., January 25, 1906.

There are three great temperature movements affecting the thermometers thruout the world, all closely recorded and arising from well-known causes: (1) the diurnal range between the extremes of night and day, (2) the annual seasonal changes, and (3) the nonperiodic temporary changes incident to the passing of the high and low barometric areas shown on the daily weather maps. The second of these is indicated by the normals established from the averaging, from long periods, of the daily means, and the third by the departures of the daily means from the daily normal.

I wish to call attention to a fourth great movement of temperature, as it is quite manifest to the industrial interests of the country. It is that which brings us a warm or cold winter or summer and a late or early spring or autumn. The contrast between this winter (1905–6) and that of a year ago (1904–5) may be cited—in the one case (1905–6) an open winter, with little snow and rivers free from ice, and in the other (1904–5) deep snow and great frost. This present paper is written to explain a method for measuring these great general departures, or long enduring departures, from normal temperatures.

These movements of temperature are masked much as is the tide in mid-ocean to the mariner, who can see only the waves. Yet if he could have a measure of the wave levels, above or below the general sea level, an average of such measurements would give him the tide level; and if he had this datum from points covering a vast extent of the ocean he would know of the general movement of the tides. As applicable to the motion of mercury in the thermometers this illustration is close, the daily departures being the waves and the daily normals the datum planes. We have the temperature measurements, and by eliminating the *waves* we can, I believe, determine what may well be called the temperature *tide* or *course*.

The difference between the mean temperature of a month and the normal of the month shows the departure of temperature for the month. Now if this is a good rule for the thirty days of the calendar month then it should be good for a